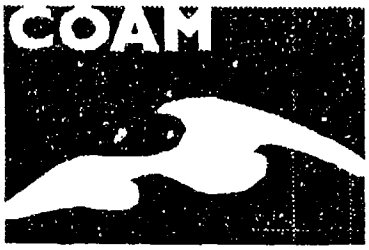

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NOMADS
GRAPHICAL USER INTERFACE
VERSION 2.0
USER'S MANUAL

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The University of
Southern Mississippi

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EXECUTIVE SUMMARY

The Naval Ocean Models and Acoustic Demonstration System (NOMADS) Version 1.0, designed by Linda Knauer, is a collection of individual programs used to test ocean model concepts. It is accessed through a less-than-optimal screen-menu interface.

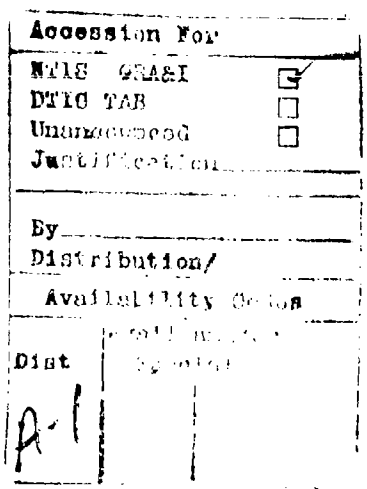
The NOMADS GUI V2.0 is an updated version that provides an interactive, Graphical-User-Interface (GUI). This new GUI makes it simpler and faster to execute the different aspects of NOMADS. In addition, the NOMADS GUI V2.0 now has an increased error-checking ability as well as a near "bullet-proof" design.

Initially, an attempt was made to modify the NOMADS V1.0 programs to accept events generated from the GUI. This task proved to be extremely time consuming as the interdependency of the subroutines and functions of NOMADS V1.0 had grown as the programs had evolved. Moreover, as is often the case with such tools, there were numerous programs added to increase the functionability and robustness of the software which, in turn, added to the complexity of the code.

Under the supervision of Dr. George Heburn, the Contracting Officer Technical Representative, it was decided to extract from NOMADS V1.0 only those programs which would best serve as a foundation for the "new" GUI enhanced version. In addition to these pieces, new programs have been written, using primarily the UNIX C-Shell, to relay information between the Motif interface and the NOMADS executables.

The code architecture was implemented with a modular approach to increase the flexibility of the NOMADS GUI software. This flexibility enables this latest version, (V2.0), to be further altered and/or enhanced with additional functionability, yet with minimal programming.

Furthermore, the NOMADS GUI V2.0 includes a selection, Utilities, which can be customized to the user's requirements without altering the structure and architecture of the core NOMADS software.



ABSTRACT

The Naval Ocean Models and Acoustic Demonstration System (NOMADS) Version 1.0 was updated to provide an interactive, mouse-driven Graphical-User-Interface (GUI). This manual describes the software capabilities and provides instructions for the user of the NOMADS GUI Version 2.0.

This document constitutes the Final Report under NRL Contract No. N00014-93-C-6010.

1.0 INTRODUCTION

1.1 Purpose

The Naval Ocean Models and Acoustic Demonstration System (NOMADS) V1.0 is a collection of individual programs accessed through a less-than-optimal screen-menu interface. It is presently being used to test and evaluate the Modular Ocean Data Assimilation System (MODAS).

The current NOMADS Graphical User Interface (GUI) V2.0 is mouse (event) driven, which makes it simpler and faster to access and execute the different aspects of the NOMADS software. Additionally, the NOMADS GUI has an increased error-checking ability as well as a near "bullet-proof" design. The NOMADS GUI V2.0 also has the characteristic that it may be altered or enhanced with additional functions and tools with minimal programming, due to the modular approach that was used in its design.

1.2 Creation

The NOMADS GUI was created, for the most part, with the Builder Xcessory (BX), Version 2.5, code generator from Integrated Computer Solutions Incorporated. BX generates C code to create a Motif/Xt interface. The system requirements for the NOMADS GUI V2.0 are:

a. UNIX operating system

b. X-WINDOWS capabilities

c. MOTIF libraries from the Open Software Foundation

d. Two-button or three-button mouse

e. NOMADS code and scripts

f. NOMADS GUI code

g. Hierarchical Data Format (HDF) utilities, developed by NRL-Stennis and NCSA, (for more information on HDF, see via xmosaic, http://hdf.ncsa.uiuc.edu:8001/)

Optional NOMADS GUI utilities include:

a. Ocean Tool Kit (OTK), developed by NRL-Stennis, which includes a self-contained graphics package, (for more information, see via xmosaic, http://www7320/html/maloy/otk.html)

b. inspectHDF [sic] - an HDF utility contributed to The National Center for Supercomputing Applications (NCSA) by Neil Buesing, formerly of EROS Data Center at Sioux Falls, South Dakota, and enhanced locally by Dr. Alan Wallcraft and Bill Maloy. inspectHDF [sic] is a freely-distributed program and is available from NCSA, via xmosaic. (See ftp://opus.ncsa.uiuc.edu/pub/dist/HDF/contrib/inspectHDF)

1.3 The Mouse

Either a two-button or a three-button mouse may be used. The left mouse button is used to select; the other buttons are not currently implemented. The following terminology is used to refer to actions involving mouse buttons: "click/select/choose" means to press and release a button without moving the mouse pointer. When a selection is "grayed out," it unselectable by the user. (See Figure 7)

1.4 Entering Text

To select an input field, point to that field and click the mouse button. Use <Backspace> and/or <Del> to delete unwanted characters. To delete unwanted characters on some keyboards, the user must click the offending text, (the text will then be highlighted), and then enter the needed changes. To add to existing text, move the mouse pointer to the exact point where the text is to be entered and begin typing. Once done, either hit <return> or click the OK button, if available.

WARNING: On selections such as "Define Analysis Area", if the text is entered manually, failure to hit <enter> causes the newly-entered text to be ignored. In addition, most of the selections found in the NOMADS GUI V2.0 have a "Cancel" option associated with them. Clicking this option enables the user to leave the current selection unchanged.

1.5 The NOMADS GUI Program

Prior to executing the NOMADS GUI, the user should ensure that the environmental variable MODAS_HOME has been defined. This variable is used to define the top MODAS directory. Under this will be the directories, the executables, and the information needed by MODAS. In this way, NOMADS GUI portability is achieved with a minimum of work.

If, upon execution of the NOMADS GUI, MODAS_HOME is found to be undefined, an error message is generated. If the user wishes to continue, he/she will be limited as to the extent to which the GUI can be used.

Once the NOMADS GUI is executed, six selectable items will be displayed on the screen. (See Figure 1)

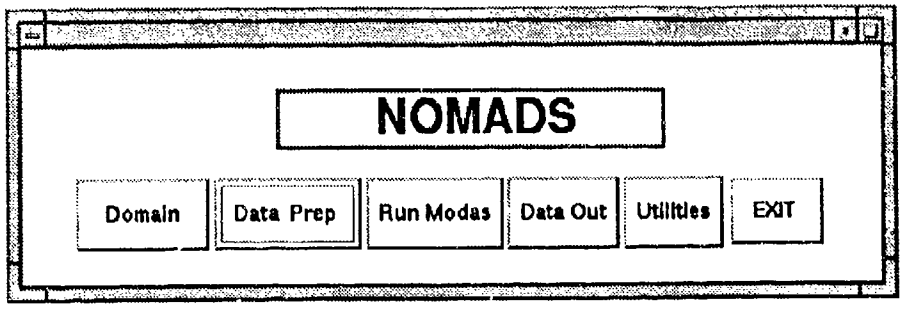


Figure 1

2.0 DOMAIN

Under the "Domain" option, the geographical regions are selected and the numerical parameters are defined for the MODAS runs. (See Figure 2)

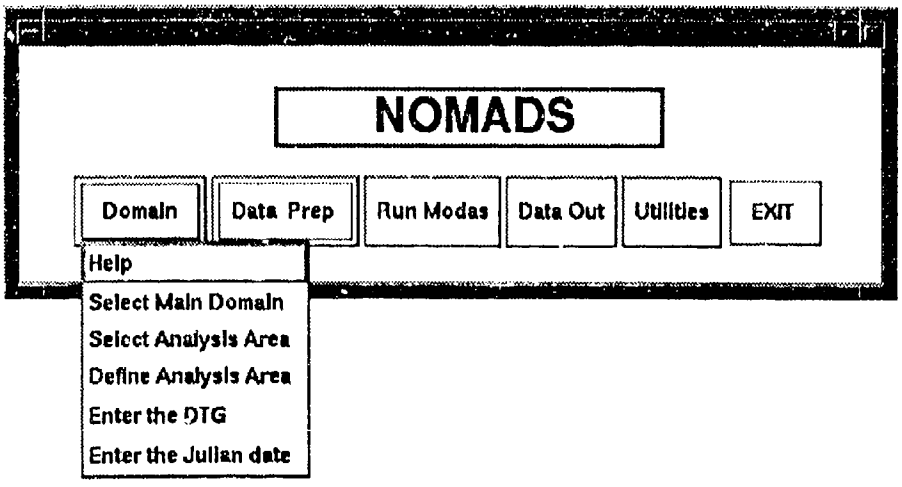


Figure 2

2.1 Select Main Domain - allows the user to choose an ocean or sea from a predefined list located in the domain.list file. If this list is not present in the

current working directory, an error message is generated and an opportunity to define the domain list is given.

2.2 Select Analysis Area - prompts the user to select from a list of predefined analysis areas. These analysis area parameters must be in the SED format: s/pattern/replacement/ and must be in a *.sed file. For more information on SED, consult the local man-page.

If areas to be analyzed have not been previously defined, the user should select "Define Analysis Area".

2.3 Define Analysis Area - displays an analysis area template (see Figure 3) for defining the geographical and numerical domain. These numerical parameters

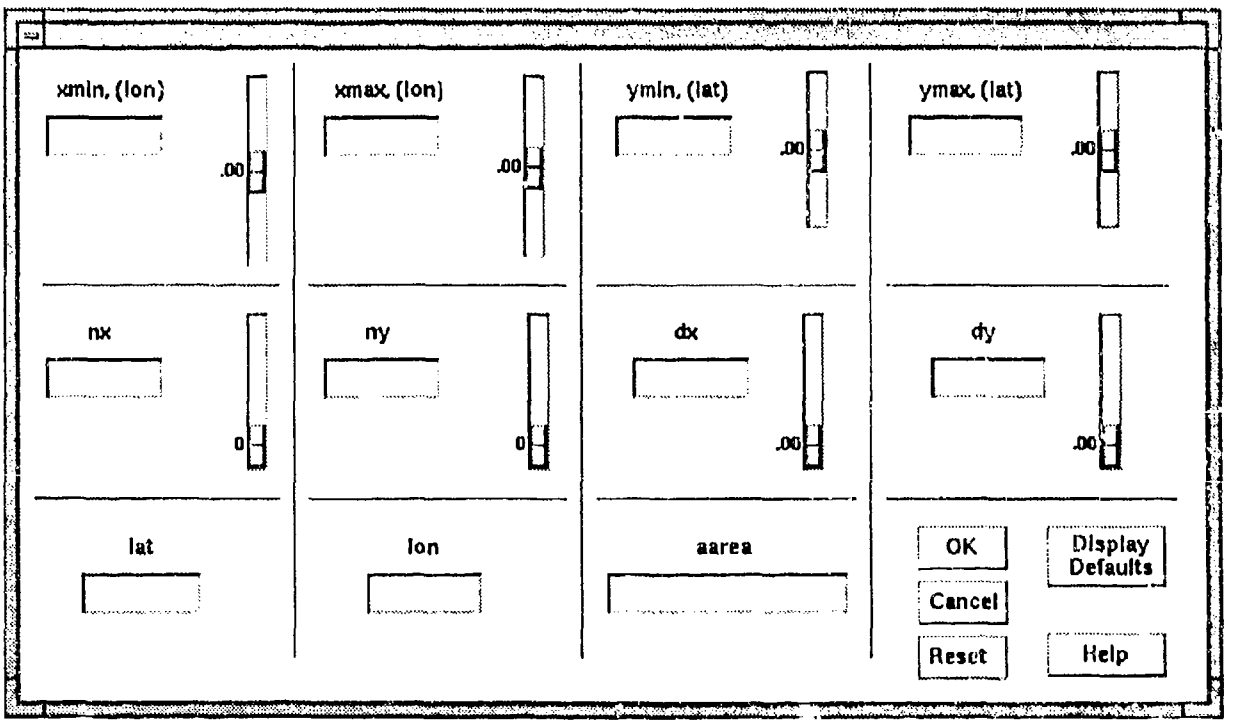


Figure 3

may be defined by entering a text value or via slide-scales. To manipulate the decimal value with the slide-scale, "click" the shaded area under/over the slider.

If an analysis area has been previously selected, its corresponding values are displayed in the template. The listing of predefined areas may also be accessed via the selection "Display Defaults" for altering an existing analysis area. When an existing area is altered, the user is asked where the changed template should be saved. Furthermore, as some of the template values are dependent upon other template values, such as geographical coordinates, (xmin), and point spacing, (dx), the dependent values are automatically updated and displayed in the template.

For numerical applications, it is convenient to enter the geographical coordinates in degrees/tenths, (Xm, Ym), rather than in degrees/minutes, (lon, lat). For this reason, an algorithm to convert the two values is automatically employed. If a value is out of range, an error message is displayed and the values are returned to their previous state. (See Figures 4 and 5)

2.4 Enter the DTG - prompts the user to define the date in the day-month-year (ddmmyy) format. There is an option for converting the date to the Julian date format.

2.5 Enter the Julian Date - prompts the user to define the date in the Julian date format.

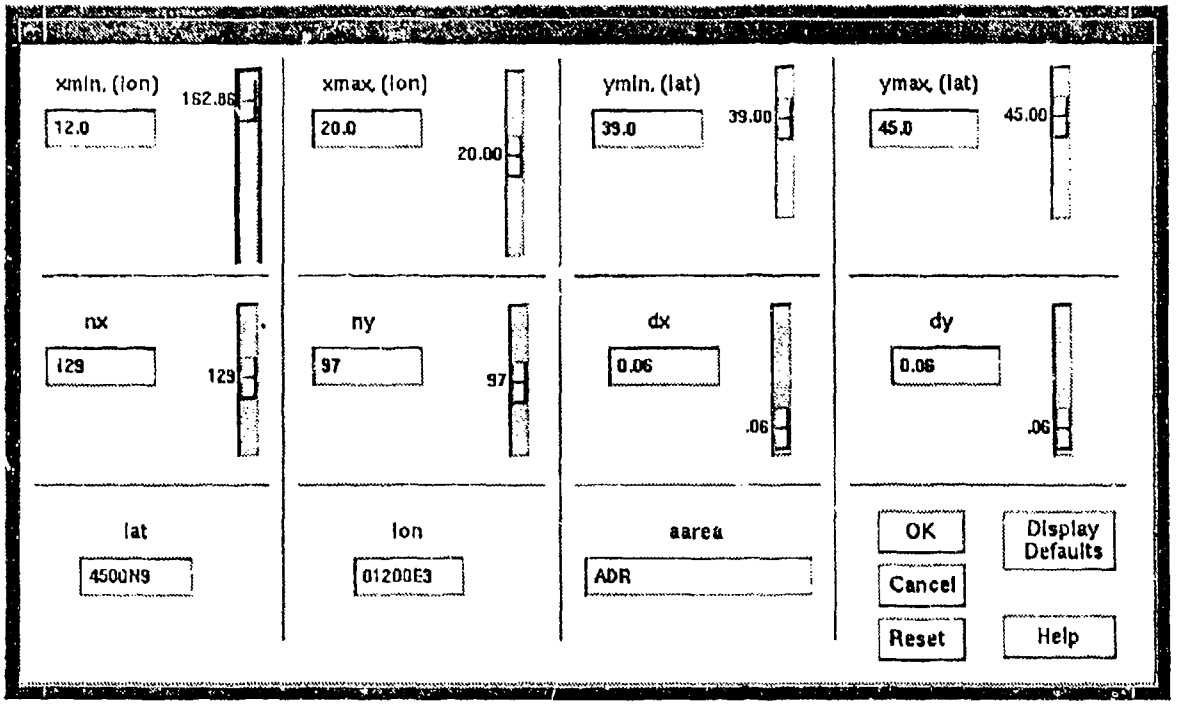


Figure 4. The xmin slide-scale is changed to 169.09.

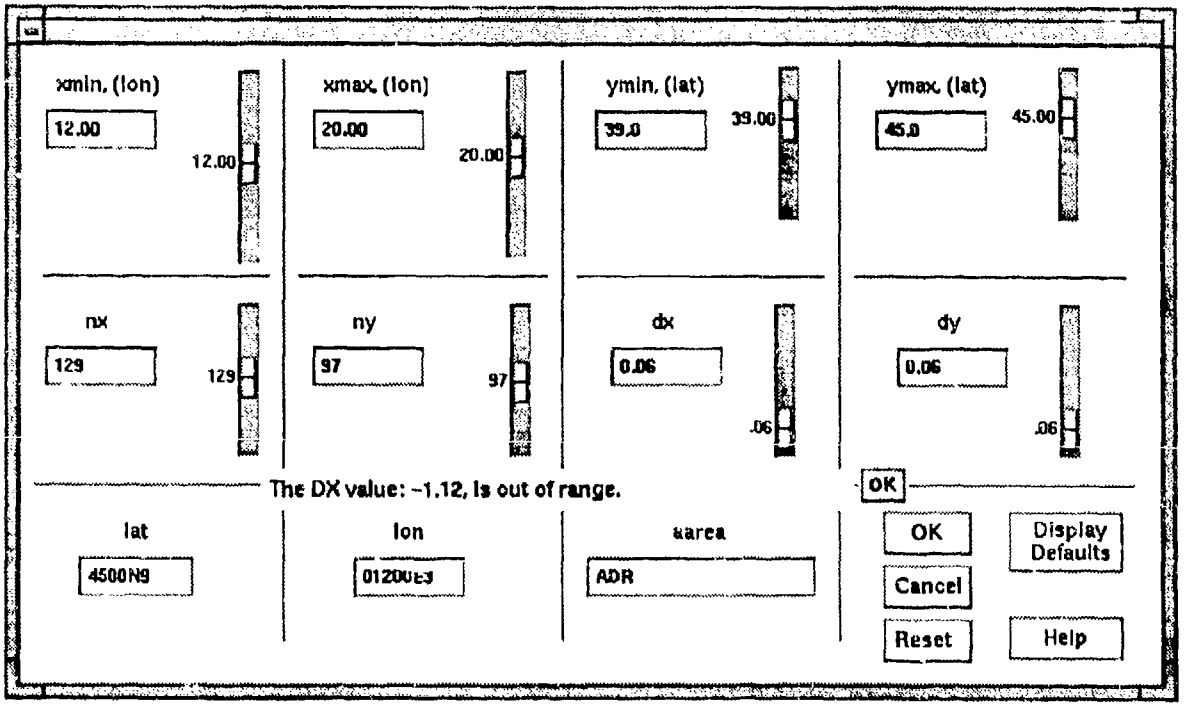


Figure 5. An xmin value of 169.09 caused the dx value to go out of range. An error message is generated, and xmin is returned to its previous value.

3.0 DATA PREP

Click "Data Prep", and the selections "Parse XBT", "Run BTX", and "Run Otis Input" appear. These selection are used to prepare input data for MODAS execution.

3.1 Parse XBT - a C-Shell script to read JJXX messages and load the BTs into the Sonalyst SDB Data Base.

3.2 Run BTX - a C-Shell script to extract BTs for a given area and time from the Sonalyst SDB Data Base and to put it in the format needed by MODAS.

3.3 Run OTIS Input - a C-Shell to decode the FNMOC OTIS messages and to convert the OTIS field to an HDF format for use by MODAS.

All three of the Data Prep choices prompt the user for any missing information needed by the main programs. If the proper environmental variables are not present, the user is asked to define them. If the required subprograms are not in the local working directory, the NOMADS GUI program informs the user of the missing program/script and asks whether the user wants the GUI to search for and copy the needed programs. If more than one program/script of the same name is found, the user is instructed to select one. Once all the needed information and programs are in place, the initially-selected program, (Parse XBT, Run BTX, or Run Otis Input), will continue. Any subsequent errors will be displayed for the user.

4.0 RUN MODAS

Click "Run Modas", and the MODAS options are displayed. These are used to execute 2-D and 3-D MODAS analyses using different first-guess techniques.

4.1 3-D OTIS - Runs a 3-D MODAS analysis using OTIS as the first-guess field.

4.2 3-D GDEM - Runs a 3-D MODAS analysis using GDEM as the first-guess field.

4.3 3-D MODAS 2-D - Runs a 3-D MODAS analysis using a 2-D MODAS SST analysis as a first-guess field and GDEM FM to extend to a 3-D field.

4.4 2-D OTIS - Runs a 2-D MODAS SST analysis using the OTIS SST fields as a first-guess field.

4.5 2-D GDEM - Runs a 2-D MODAS SST analysis using the GDEM SST field as a first-guess field.

5.0 DATA OUT

Click "Data Out", and the selections "Run Compac" and "Parse GF" appears. These are used to output the results from the MODAS analysis.

5.1 Run Compac - creates a compacted message from the MODAS fields.

5.2 Parse GF - decodes compacted messages and puts MODAS fields into the Sonalyst Compacted Fields Data Base.

6.0 UTILITIES

Utilities is a customizable selection that can contain a variety of tools and utilities. For the most part, any tools that a user wishes to add to this section

can be done with a minimum of programming. The following tools are included at the present time:

6.1 BT - runs the Sonalyst BT Editor program.

6.2 BRIEF - runs the Sonalyst Brief Preparation and Briefing programs.

6.3 OTK2D - a GKS-based plotting program, produces 2-D plots from files written in the HDF format. The option "OTK2D" displays a file-selection box. When the user chooses a file, a message is generated asking whether the HDF file is ready to be plotted. If it is, a template for "OTK2D" is displayed. (See Figure 6). For additional help, select "OTK2D MAN PAGE". To view the HDF

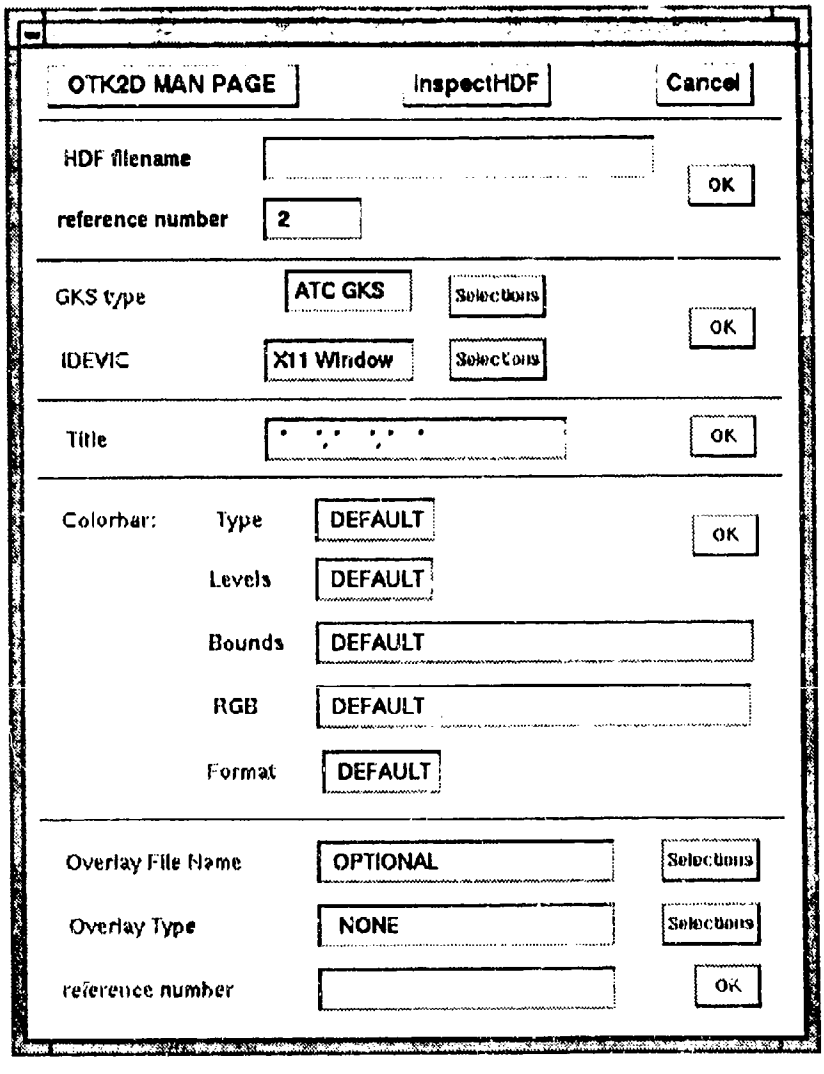


Figure 6

file, select inspectHDF". If a file is not currently ready for plotting, the NOMADS GUI assumes that a slice or slab from a data set needs to be extracted. If the user wants a slab extracted, they are prompted for the level from which to take the data. If a slice is needed, a template for this is displayed. (See Figure 7)

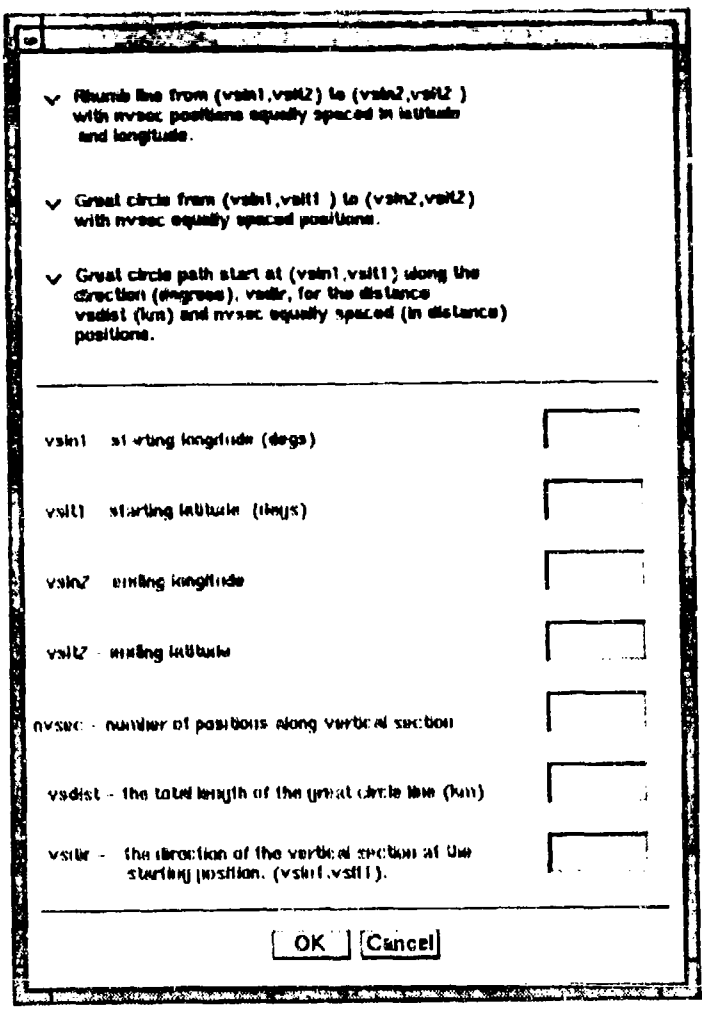


Figure 7. After the user selects from one of the top three options, its corresponding parameter inputs (currently grayed out) will be highlighted.

6.4 inspectHDF [sic] - used to extract information from an HDF formatted file.

6.5 Compact Grid - displays the MODAS fields using the Sonalyst Compact Field programs.

6.6 File Browser/Editor - a simple but effective tool for viewing, altering, and creating text files. The bulk of the code for this selection was written by Dan Heller and is Copyrighted 1991 by O'Reilly & Associates.

6.7 Difference HDF Files - another HDF utility, designed and written by Dr. Alan Wallcraft and Bill Maloy, Planning Systems, Inc., to create an HDF file that is the mathematical difference of two others. Upon selection of "Difference HDF Files", a template is displayed as well as a message pertaining to the numbering of scientific data sets. For more information on the differencing of two HDF files, select "Help". If additional information on the HDF file is needed, choose "InspectHDF". (See Figure 8)

7.0 **EXIT** - allows the user to terminate the NOMADS GUI.

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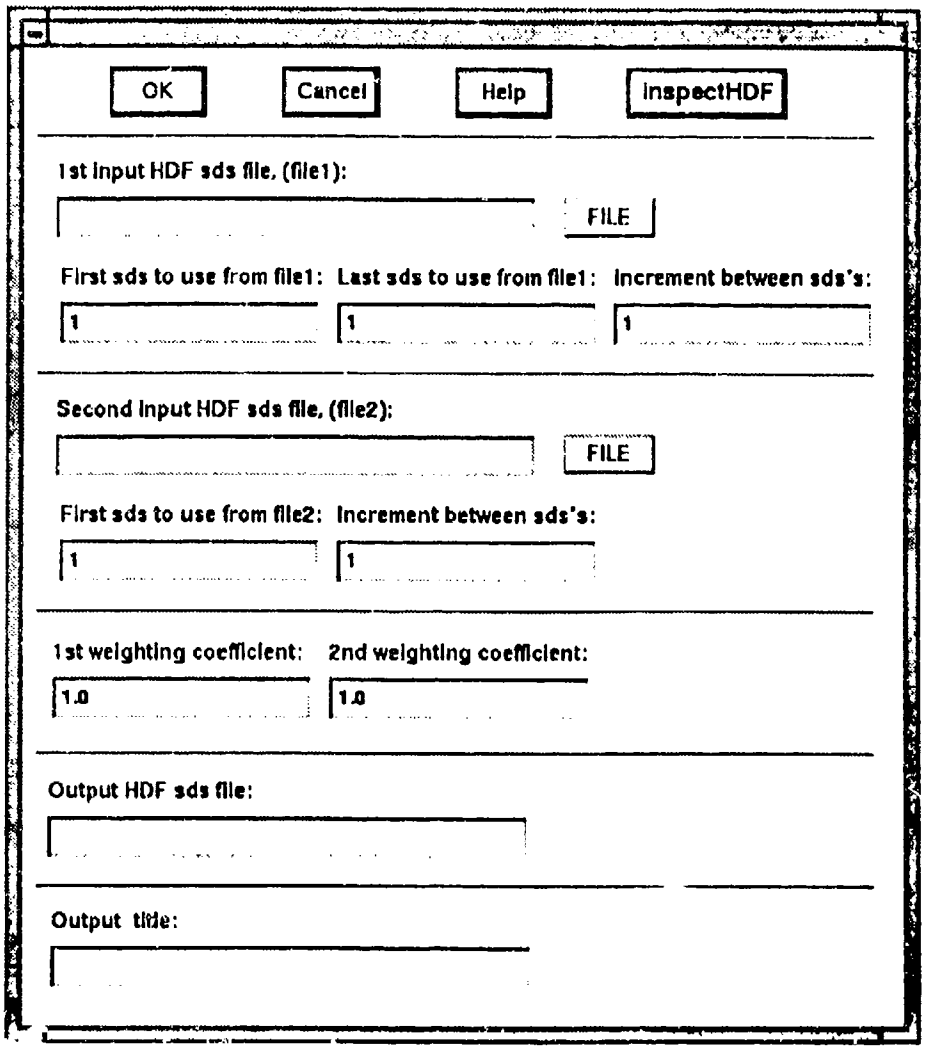
OK
Cancel
Help
InspectHDF
1st input HDF sds file, (file1):
FILE
First sds to use from file1:
Last sds to use from file1:
Increment between sds's:
1
1
1
Second input HDF sds file, (file2):
FILE
First sds to use from file2:
Increment between sds's:
1
1
1st weighting coefficient:
2nd weighting coefficient:
1.0
1.0
Output HDF sds file:
Output title:

Figure 8

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